



Convection in Gases and Liquids

NS 696 V: Weather and Climate for Educators

Colorado State Standards

Standard 1:

Students apply the processes of scientific investigation and design, conduct, communicate about, and evaluate such investigations.

Standard 2:

Physical Science: Students know and understand common properties, forms, and changes in matter and energy.

Purpose:

A hawk or bird gliding through the sky will rarely flap its wings. Birds conserve energy by gliding on columns of warm air rising up from the heating of Earth's surface. These columns are convection currents formed when gases, or liquids, are heated unevenly, and the warmer, less dense fluid is forced upward. In this activity you will create and observe your own convection currents.

Goals:

Students will learn how to create models of actual convection currents.

Students will be able to observe convection currents in both a liquid and air.

Materials:

hot plate

water

candle

500 ml beaker

black pepper

matches

triple beam balance

Procedure:

1. Pour 450 ml of water into a 500 ml beaker.
2. Use balance to measure 1 g of black pepper.
3. Sprinkle the pepper into the beaker of water.
4. Let the pepper settle to the bottom of the beaker.
5. Heat the bottom of the beaker using the burner or by placing it on the hotplate.

6. Observe how the particles of pepper move as the water is heated, and make a drawing showing their motion.
7. Turn off the hotplate. Light candle and let it burn for a few minutes.
8. Blow out candle, and observe the motion of the smoke.
9. Make a drawing of the movement of the smoke.

Conclude and apply:

1. Describe how the particles of pepper moved as the water became hotter.
2. How is the motion of the pepper particles related to the motion of the water?
3. Explain how convection current formed in the beaker.
4. Explain why the motion of the pepper changed when the heat was turned off.
5. Predict how the pepper would move if the water were heated from the top.
6. Describe how the smoke particles moved when the candle was blown out.
7. Explain why the smoke moved as it did.

Extension:

Although most of Earth's rain forests are located near the equator, the west coast of the Pacific Northwest receives great annual rainfall and has some rain forest area. The western coasts of Vancouver Island and the Olympic Peninsula, for example, contain rain forests. Have the students research this phenomenon and draw maps showing the heat flow patterns that cause moderate temperatures and substantial rainfall in the region

Lesson generated by Mark Parrish